

<b>Title:</b> Just A Little Oil Spill			
<b>Author:</b> Kathy Rusert Acorn High School Mena			
<b>Course:</b> Biology, Environmental Science, Earth Science, Statistics and Algebra			<b>Duration:</b> One class period
<b>Grade:</b> 9-12			
<b>Objective:</b> Students will measure how fast oil is spread to simulate an oil spill.			
<b>Summary of Lesson:</b> Using vegetable oil and water, students will determine that a little oil spill covers a large area. They will apply this to an oil spill in the ocean and create a plan for cleanup that will not harm the environment.			
<b>CODE</b>	<b>GRADE</b>	<b>SLE</b>	<b>STANDARD</b>
Biology	9-12	BI-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*
Environmental Science	9-12	EVS2-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
	9-12	EVS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
	9-12	EVS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
	9-12	EVS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity
Earth Science	9-12	ES-ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
	9-12	ES-ESS1-6	Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
	9-12	ES3-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller,

			more manageable problems that can be solved through engineering.
<b>Statistics</b>	<b>9-12</b>	<b>CP.2.S.1</b>	Create and use mathematical models for bivariate data sets to <ul style="list-style-type: none"> <li>• answer questions</li> <li>• draw conclusions</li> <li>• make decisions</li> </ul>
<b>Algebra</b>	<b>9-12</b>	<b>HSA.CED.A.1</b>	Create equations and inequalities in one variable and use them to solve problems Note: Including but not limited to equations arising from: <ul style="list-style-type: none"> <li>• Linear functions</li> <li>• Quadratic functions</li> <li>• Exponential functions</li> <li>• Absolute value functions</li> </ul>
<b>Teacher Excellence Support System (TESS):</b> 3b: Using questioning/prompts and discussion, 3d: Using assessment in instruction			
<b>Instructional Strategies and Practices</b> Experiment, Lab, Model, Movement, Visualization and Guided Imagery			
<b>Bloom’s Level:</b> Highest Level Only Create			
<b>Materials and Resources:</b> <ul style="list-style-type: none"> <li>• One aluminum pie plate filled with water for each lab station</li> <li>• Vegetable oil</li> <li>• Pipette</li> <li>• Metric ruler</li> </ul>			
<b>Formative Assessment:</b> Exit Slip—how does this experiment relate to an oil spill in the ocean?			

**Notes to Teacher:**

While using dish detergent to break the surface tension, animal habitats could be damaged or destroyed.

Students will need to measure the volume of "one drop." (1 mL = 1 cm to third power to allow for easy conversion for gallons to cm to third power).

Formula:  $\frac{Ad}{Vd} = \frac{As}{Vs}$       Ad = area of drop  
                    Vs      As = area of spill

**Student Activity**

1. Use a pipette to put one drop of vegetable oil into the center of the pie plate
2. Observe what happens for 15 seconds and record observation.
3. Use a metric ruler to measure the diameter of the oil spill.
4. Determine the area of the oil spill (formula:  $A = \pi r^2$ )
5. Analyze:
  - If one drop of oil covered this area, predict how much area would be covered by a 500-gallon oil spill in the ocean.
  - Devise a plan to clean the oil from the surface of the water that would not harm animals or vegetation.
6. Exit Slip—how does this experiment relate to an oil spill in the ocean?